

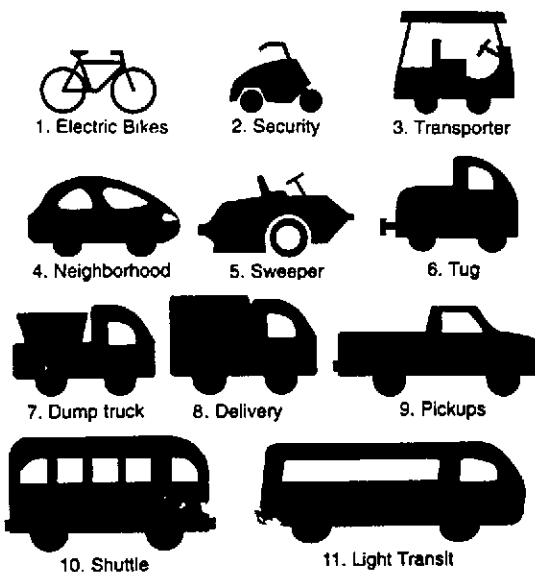
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## Bay-Delta Airports - Electric Vehicle Demonstration Project

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July 28th, 1997



ELECTRIC VEHICLES

CALFED BAY/DELTA PROGRAM

## I. Executive Summary

The Bay-Delta Airport Electric Vehicle Demonstration Project is being applied for by the City of Alameda, Bureau of Electricity.

The projects mission is to first educate and convert Bay-Delta Airports and Air bases from the utilization of highly polluting and noisy internal combustion vehicles to clean, no-tailpipe, no-liquids, no-noise vehicles. The secondary mission is to educate airports and air bases throughout California to the ecological benefits of converting to electric vehicles.

The six year program is divided in two, 3 year phases and will positively impact the Bay-Delta airports of Redding, Red Bluff, Chico, Marysville, McClellan AFB, Sacramento International, Alameda restricted-use, San Francisco International, Oakland, Stockton, Modesto and Fresno.

Five water pollution problems; (a) gasoline/diesel leakage, (b) MTBE's, (c) radiator coolant, (d) oil and fuel filters and (e) increased fertilizer use for pollution weakened crops are greatly minimized by the use of the clean airport electric vehicles. The reason, the airport vehicles listed below can be utilized at hundreds of Bay-Delta airport gates and they need no gasoline, diesel, MTBE's, coolant, oil, or filters and at the same time can reduce air pollution by 70%.

### Airport Electric Vehicle's

#### AIRSIDE:

|                   |   |  |
|-------------------|---|--|
| <u>TARMAC:</u>    | Baggage Cart Tow<br>HD Aircraft Tow-Pull back<br>Baggage Conveyer<br>Maintenance Flatbed Truck<br>Tarmac Delivery Truck | Lt Aircraft Tow-Pull back<br>Movable Staircase<br>Lav Cart<br>Sweeper-Scrubber<br>Food-Service Truck |
| <u>OPERATION:</u> | Pickup Truck-Security<br>Personnel truck-6<br>Crew Bus-"C" & "D"  | Personnel truck- 4<br>Utility Van  |

#### GROUND SIDE:

|                    |   |  |
|--------------------|---|--|
| <u>TERMINAL:</u>   | Passenger Transport Tram-4<br>Currency Exchange Wagon<br>Lowboy Turf truck                      | Passenger Transport Tram-6<br>Restroom Service Van<br>Terminal Operations Flatbed          |
| <u>FRONT SIDE:</u> | Security Bike<br>Meter Reader<br>Utility Staff Van<br>Parking lot Shuttle-<br>Car/Hotel Shuttle | Security Chariot<br>Security Truck<br>Staff Car<br>Parking lot Bus<br>Rental Car/Hotel Bus |

**Our approach** is to implement an airport electric vehicle (EV) Demonstration Center at the restricted use airfield at Alameda's recently closed Naval Air Station . This Center would have an airport operation with examples of airport electric vehicle listed and aircraft (737's to Commuter) requiring servicing at the center's demonstration gate.

The Alameda Center and it's eleven (11) Bay/Delta satellite airports would work together to educate airport and air base operations people how clean EV's are better for the water and air supply. Funding for the overall project would be supplied by Air Quality Management Districts, CALFED, The Alameda Bureau of Electricity and Air Operations.

**Phase I** ('98,'99 & 2000) implements the Airport Center in Alameda, secures the electric vehicles and completes the Bay/Delta airport education process through 30 months of demonstrations, seminars and reporting. All twelve local airports will be educated in the first 18 months of the project. The Alameda Airport Center program is designed to become self sufficient by the third year. **Phase II** (2001, '02 and '03) is the follow through stage and much of the funding is entirely focused on the 11 satellite Bay/Delta airports and helping them to secure their own clean EV's and infrastructure at as many of their passenger/freight gates as possible.

**CALFED should fund** half of this project because it will positively impact twelve significant Bay/Delta public transportation operations that utilize a great many internal combustion vehicles and potentially annually reduce gallons of fuel, gallons of coolant and quarts of oil. European countries use six times as many electric vehicles in airports as we do therefore, this clean water solution is certainly implementable. By working together with the Air Quality groups clean water and air can be addressed at the same time in the Bay/Delta region.

The total project is **\$3,445,000**. Proposals have already been submitted to the Bay Area Air Quality Management District totaling **\$302,000**.

**Funding** proposal are being drafted for other Bay/Delta Air Quality Management Districts. Our CALFED 45% request is **\$1,550,000** .

The Alameda Bureau of Electricity is qualified to run such a Electric Vehicle Project due to their 110 years evolving into a fully integrated municipal electric utility. Alameda understands the importance of water and as an island is surrounded by the precious liquid. Alameda's focus on electric vehicles is for the protection of the water, air and energy. The Bureau is experienced in documentation of technical projects and has good ongoing relationships with Bay/Delta environmental organizations.

## II. Bay-Delta Airports - Electric Vehicle Demonstration Project

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July 28th, 1997

Applicant: **Alameda Bureau of Electricity**

2000 Grand Street  
Alameda, CA 94501

A 110 year old Municipal Electric Utility  
Tax Status: Exempt

Tax identification Number: 94-2951628

Technical and Financial Contact Person:  
Jim Baak, EV Program Coordinator  
(510) 798-3944

Planned Participants and Collaborators in project:

City of Alameda, Bureau of Electricity  
Bay Area Air Quality Management District  
Air Quality Management Districts

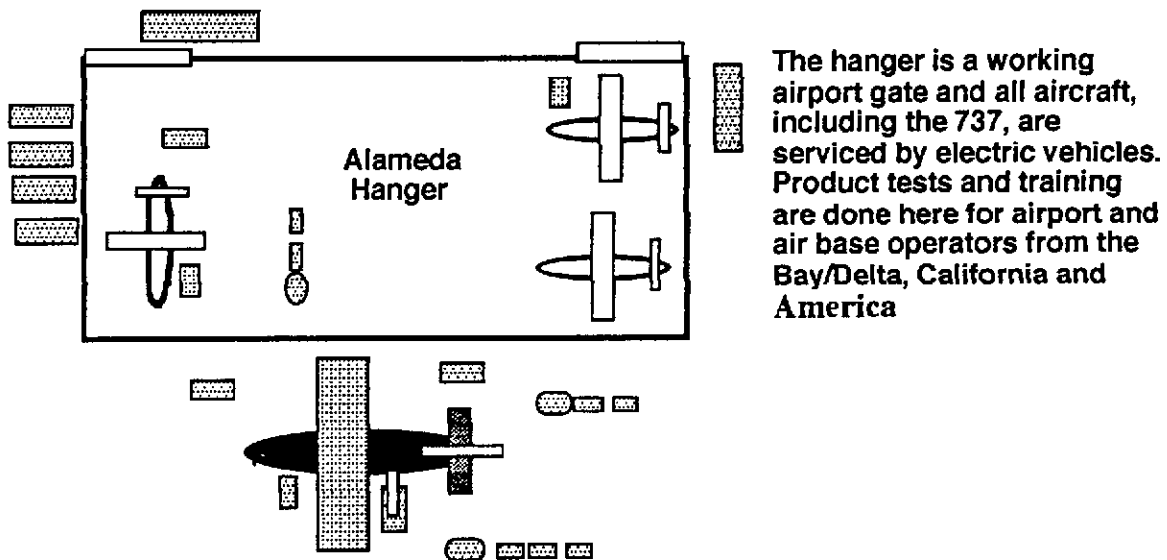
Airports: Redding, Red Bluff, Chico, Marysville,  
McClellan AFB, Sacramento International, Alameda  
San Francisco International, Oakland , Stockton,  
Modesto and Fresno.

Synergy EV Inc.

RFP Project Group Type: Services : Water Quality  
*A Demonstration & Education Project: 1997-Category III*

**III. The project description** is to develop an airport electric vehicle demonstration center at a airfield hanger near the restricted use airfield at Alameda. This center will be operated by the Alameda Bureau of Electricity to demonstrate how an all electric passenger gate and terminal can efficiently function and eliminate harmful water and air pollution.

The hanger will be leased from the City of Alameda and it will house aircraft, including 737's, commuter and historic warbirds. In addition, over 20 airport electric vehicles will be purchased and operated in support of the aircraft.



The Demonstration Center will house an Education Center for Industry Training. EV Manufacturers will have offices to support the Ed Center. Airport staff will show visitors how the all electric airport works, on an appointment only basis. The Bay Delta satellite airports will be able to use the Center for their projects, training sessions and product tests.

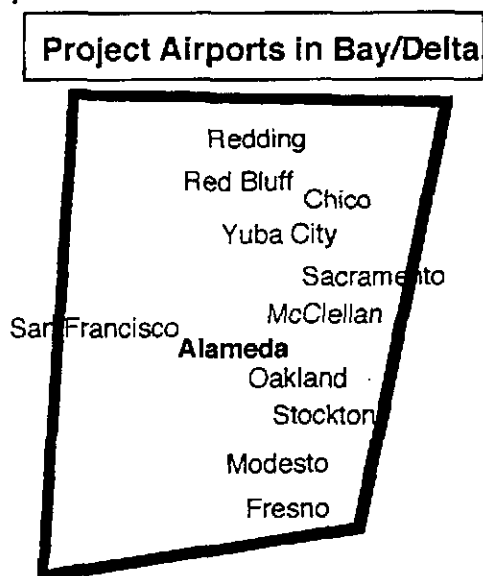
Extensive reporting and documentation will provide airports a "Blueprint" to water and air pollution reduction at their facilities. This information and the facility will be available to the Bay/Delta Satellite airports.

**The projects mission** is to effectively demonstrate the use of EV's at airports, educate other airport operators to this clean technology and help Bay/Delta airports to obtain their own clean vehicles by combining their equipment budgets with the assistance of Water and Air Quality funding.

We will attempt to convert Bay-Delta Airports and Air bases from the utilization of highly polluting internal combustion vehicles to clean, no-tailpipe, no-liquids, no-noise vehicles that can do the airport job, usually with lower operating costs. The secondary mission is to educate airports/air bases throughout Northern California to the ecological benefits of converting to electric airport vehicles.

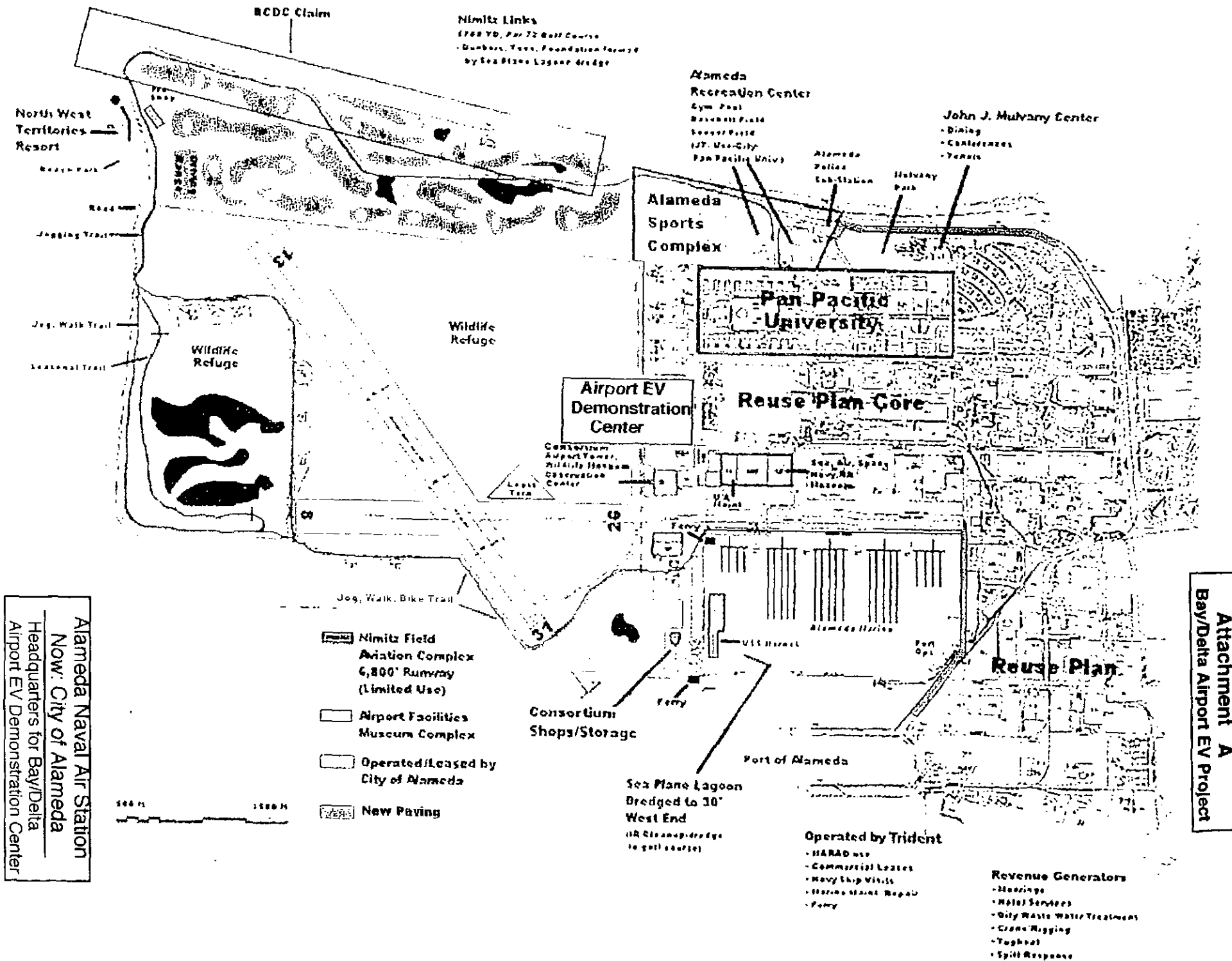
**The geographic boundaries** include airports in the Bay/Delta region. The six year program is divided in two, 3 year phases and will positively impact the Bay-Delta airports of Redding, Red Bluff, Chico, Marysville, McClellan AFB, Sacramento International, Alameda restricted-use, San Francisco International, Oakland , Stockton, Modesto and Fresno.

The graphic below shows the full coverage our project provides to the Bay/Delta geographic region as we improve the health of the Bay/Delta ecosystem through Airport improvements.

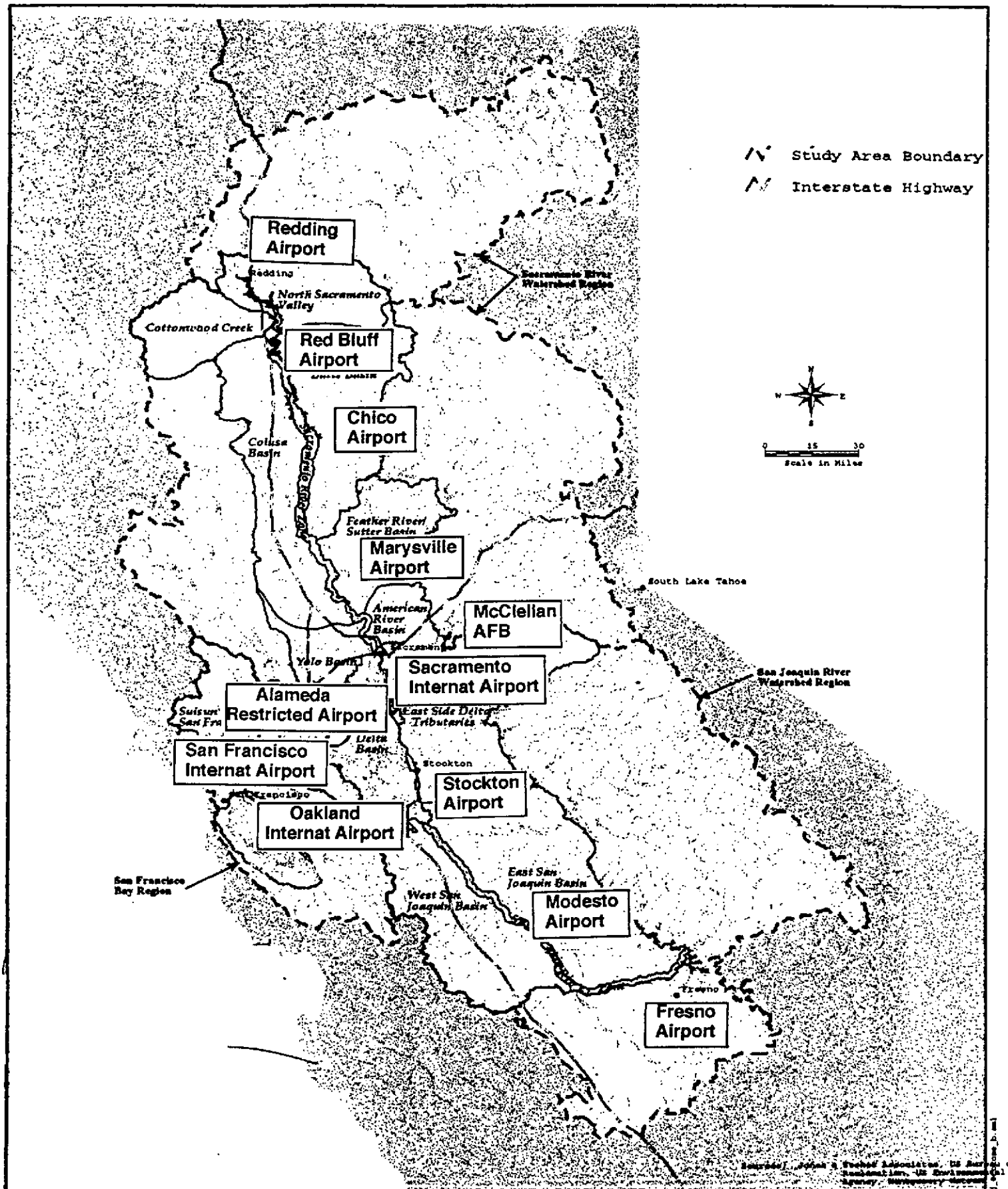


**The twelve Bay/Delta airports to be involved in this program are shown on the layout of Northern California. This airport group covers the Watershed, North and South Delta area**

We have a well balanced selection for the Airport project. There are four (4) Class A-large, three (3) Class B-medium, and five (5) Class C-small airports to be included. One Military Base is involved with ten Commercial facilities and one restricted use air field.



# GEOGRAPHIC SCOPE OF BAY/DELTA AIRPORT PROJECT



**The Expected Benefits** include reducing water and air pollution within the Bay/Delta region.

The five vehicle pollution problems; (a) gasoline/diesel leakage, (b) MTBE's, (c) radiator coolant,(d) oil and fuel filters and (e) "pollution repair" fertilizer use are greatly minimized by the application of clean airport electric vehicles. The reason this project is good for the ecosystem is that the airport vehicles listed below, could be utilized at hundreds of Bay-Delta airport gates, and need no gasoline, diesel, MTBE's, coolant, oil, or filters while reducing air pollution by 70%

|                     |                    | <b>Airport Electric Vehicle's</b> |                              |
|---------------------|--------------------|-----------------------------------|------------------------------|
|                     | <u>Zone</u>        | <u>#</u>                          | <u>Type</u>                  |
| <b>AIRSIDE:</b>     |                    |                                   |                              |
|                     | <u>TARMAC:</u>     | A1                                | Baggage Cart Tow             |
|                     |                    | A2                                | Lt Aircraft Tow-Pull back    |
|                     |                    | A3                                | HD Aircraft Tow-Pull back    |
|                     |                    | A4                                | Movable Staircase            |
|                     |                    | A5                                | Baggage Conveyer             |
|                     |                    | A6                                | Lav Cart                     |
|                     |                    | A7                                | Maintenance Flatbed Truck    |
|                     |                    | A8                                | Sweeper-Scrubber             |
|                     |                    | A9                                | Tarmac Delivery Truck        |
|                     |                    | A10                               | Food-Service Truck           |
|                     | <u>OPERATIONS:</u> | A11                               | Pickup Truck-Security        |
|                     |                    | A12                               | Personnel truck- 4           |
|                     |                    | A13                               | Personnel truck-6            |
|                     |                    | A14                               | Utility Van                  |
|                     |                    | A15                               | Crew Bus-C                   |
|                     |                    | A16                               | Crew Bus-D                   |
| <b>GROUND SIDE:</b> |                    |                                   |                              |
|                     | <u>TERMINAL:</u>   | G1                                | Passenger Transporter Tram-4 |
|                     |                    | G2                                | Passenger Transporter Tram-6 |
|                     |                    | G3                                | Currency Exchange Wagon      |
|                     |                    | G4                                | Restroom Service Van         |
|                     |                    | G5                                | Terminal Operations Flatbed  |
|                     | <u>FRONT SIDE:</u> | G6                                | Security Bike                |
|                     |                    | G7                                | Security Chariot             |
|                     |                    | G8                                | Security Truck               |
|                     |                    | G9                                | Utility Van                  |
|                     |                    | G10                               | Staff Car                    |
|                     |                    | G11                               | Parking lot Shuttle-         |
|                     |                    | G12                               | Parking lot Bus              |
|                     |                    | G13                               | Rental Car/Hotel Shuttle     |
|                     |                    | G14                               | Rental Car/Hotel Bus         |

*Synergy EV, Inc. Airport Electrification-4/97*

**Improved Water Quality** in the Bay/Delta region will be accomplished by eliminating fuel storage leakage and the petroleum impact, coolant and lubricant contamination at our airports. In addition, the agricultural antidotes will be greatly reduced due to low air pollution factors of electric vehicles. The five pollution elements are defined and the Impact concluded.

**1. Gasoline & Diesel:** Leakage from underground storage tanks is a serious hazard to the water supply. With gasoline and diesel containing a high level of sources of contamination, and the inability to effectively clean polluted water to drinking level standards, an enormous amount of money in clean up costs can be avoided. **The Bay/Delta Airport Project can eliminate an estimated 1,888,961 gallons of diesel and gasoline fuel needed to run practical airport support vehicles.**

**2. MTBE's:** Petroleum is made up of over 230 individual compounds and a high number of these present a potential to serious health risk for the world's population. Two of the most potentially dangerous compounds are benzene, an known carcinogen and methyl tertiary butyl ether (MTBE) which is being studied as a major source of water pollution with serious health affects. MTBE is added as an oxygenate to decrease harmful emissions and has been used in the US since 1979 when ARCO first added it to their gasoline stock and continues to be used in the "new" reformulated gasoline. **It is estimated that 48% of the fuel required for airport support is gasoline and almost one million annual gallons with MTBE's could be eliminated in the Bay/Delta area.**

**3. Coolant Contamination:** Electric Vehicles do not have the radiators with coolant that need to be drained and serviced on a routine basis. The servicing adds the potential for groundwater contamination from spillage or illegal dumping. **In the Bay/Delta Airport Project it is estimated that 10,185 gallons of coolants could be eliminated.**

**4. Oil & Fuel Filters:** The same lack of servicing pertains to oil, and oil/fuel filters. With EVs having none of these, the potential for illegal or accidental spillage is eliminated. The capacity savings can be calculated: **The 12 airport Bay /Delta project could reduce 17,690 quarts of oil requirement.**

**5. Air Pollution repair with fertilizers:** The chemical air pollution caused from mobile sources damages and weakens farm crops causing farmers to increase the use of fertilizers and pesticides that eventually pollute the groundwater.

Since there is the potential of replacing over **1750** internal combustion vehicles at the twelve Bay/Delta airports the reduction of Particulates, Hydrocarbones and Nox could be significant. Studies at two eastern urban airports show the pounds per year of these contaminants have been reduced by over 70% when electric vehicles replace internal combustion (IC).

**Conclusions:** In addition to the tremendous education value of the Airport project there is potential for real water and air pollution reduction. The attachments C & D illustrate the estimated potential pollution quantities eliminated annually. This project could result in major improvements by demonstrating, educating and assisting our twelve Bay/Delta Airports to utilize EV airport technology.

In order to estimate the pollution reductions of fuel, coolant, and oil three assumptions/conclusions needed to be made:

1. What are the types and number of electric vehicles used at airports. This was provided from experience of Synergy EV and the Alameda Bureau of Electricity.
2. What types of vehicles can the electrics replace and how much fuel, coolant and oil does that process replace. This was an estimate based upon the knowledge of airport airside and tarmac support equipment.
3. If averages can be reached per airport and airport gate then each of the twelve Bay/Delta facilities pollution reduction can be projected.

Estimates indicate the following:

|                      | Gallons   | -annual- | Quarts | Units    |
|----------------------|-----------|----------|--------|----------|
|                      | fuel      | coolant  | oil    | vehicles |
| potential reduction: | 1,883,961 | 10,185   | 17,690 | 1,782    |

The **Background & Biological/Technical Justification** is sound because it is simple. In most ways, an airport is the most ideal electric vehicle application because the distances are short, speeds slow, routes are consistent and there is a great deal of idling and waiting time. This ideal situation is not a Bay Area phenoninom, but similar throughout the World.

Only 5% of the 41,000 service vehicles now operating at the major U.S. airports are electric, yet 30% of those in European airports are electric. Studies in two urban airports show the pounds per year of pollution measurements as follows:

|                   | Particulates | Hydrocarbones | Nox     | Liquid fuel | MBTE  | coolants | oil   |
|-------------------|--------------|---------------|---------|-------------|-------|----------|-------|
| Current level     | 92,136       | 452,294       | 652,710 | 100%        | 50%   | 100%     | 100%  |
| Levels with EVs   | 25,640       | 116,740       | 197,644 | 0           | 0     | 0        | 0     |
| Percent reduction | -72%         | -74%          | -70%    | -100%       | - 50% | -100%    | -100% |

**The Proposed Scope of Work** includes the following twelve steps:

1. Opening the Airport Demonstration Hanger
2. Operating the Airport Demonstration Center
3. Purchasing the EV demonstration equipment
4. Installing the EV charging infrastructure
5. Hiring the Project Personnel
6. Maintaining the Equipment
7. Meeting with the Satellite Bay/Delta Airports
8. Developing the Airport Education Center
9. Providing the Demonstrations, Classes and Manuals
10. Administering the Center and Satellite operations
11. Assisting Airport to secure EV airport equipment
12. Collecting key data and Writing informational Reports

**The Monitoring & Data Evaluation** insures that each vehicle will be monitored for performance including range, charging needs, and ability to perform the job. This data will be used with the manufacturer to improve the product and with the airport equipment managers for purchase evaluation. These reports will be available to all Bay/Delta airports.

The airport “turnaround drills” will be monitored and documented to insure the equipment is capable of performing it’s duty in the airport process. Tests will be performed with different combinations of equipment for groundside applications. It is key the equipment will do the job.

The vehicle emissions and liquids will be checked and documented to determine the exact reduction on water and air pollution. Comparisons will be made to IC airport vehicles located at all twelve Bay/Delta airports.

**Implementability is realistic** because the equipment is capable of doing the job, it is less expensive to operate, the airport operations management need to solve a pollution problem and Air Quality Management Districts want to assist the purchases of airport EV projects. Capability, interest and financial assistance are key elements to any project. The end result is that water and air quality are improved.

Airport management is very interested in electric vehicle for groundside and tarmac support. The aircraft are under great scrutiny from a pollution standpoint yet the ground vehicle solution is far less expensive to implement. The incentive is there if the understanding is available.

Each Satellite Airport will have one of their administrators on the Pier Review Committee to make suggestions on how the project can be improved. Each Bay/Delta Airport will share in the results of the study.

**EV IMPACT ESTIMATE****Attachment C**

**Estimated pollutant quantities eliminated  
annually by the use of electric airport vehicles**

This table estimates the reduction in pollutants per type of electric vehicle by measuring what pollutants are normally eliminated with vehicles that have no fuel, MTBE's, coolant or oil. The vehicles listed are those electric vehicles that will be demonstrated at the Airport Demonstration Center and ones that would be viable for the 11 Satellite Airports.

| <u>Vehicle type</u>      | units per         |   | Fuel gal        | MTBE's         | Per Gate      | Radiator       | Oil        | Per Gate       |              |
|--------------------------|-------------------|---|-----------------|----------------|---------------|----------------|------------|----------------|--------------|
|                          | <u>gate/airpt</u> |   | <u>per unit</u> | <u>present</u> | <u>annual</u> | <u>coolant</u> | <u>qts</u> | <u>annual</u>  |              |
|                          |                   |   |                 |                | <u>FUEL</u>   |                |            | <u>COOLANT</u> | <u>OIL</u>   |
| PER GATE:                |                   |   |                 |                |               |                |            |                |              |
| Maintenance Chariot      | 1                 | G | 10 gas          | yes            | 520           | 2 gal          | 3          | 2.0            | 12.0         |
| Personnel 4 Truck        | 1/5               | G | 10 gas          | yes            | 104           | 2 gal          | 3          | .4             | 2.4          |
| Personnel 6 Truck        | 1/3               | G | 10 gas          | yes            | 104           | 2 gal          | 3          | .6             | 4.0          |
| Restroom Svc. Van        | 1/12              | G | 10 gas          | yes            | 43            | 2 gal          | 3          | .3             | 1.0          |
| Lowboy Truck             | 1/2               | G | 10 gas          | yes            | 260           | 2 gal          | 3          | 1.0            | 6.0          |
| Flatbed Truck            | 1                 | G | 20 gas          | yes            | 1040          | 6 gal          | 5          | 6.0            | 20.0         |
| Tarmac Delivery          | 1                 | G | 20 gas          | yes            | 1040          | 8 gal          | 7          | 8.0            | 28.0         |
| Tarmac Sweeper           | 1/6               | G | 20 gas          | yes            | 173           | 7 gal          | 6          | 1.1            | 4.0          |
| Retro-Baggage Ldr        | 1                 | G | 15 gas          | yes            | 780           | 7 gal          | 8          | 7.0            | 32.0         |
| Retro-Staircase          | 1/10              | G | 20 gas          | yes            | 104           | 7 gal          | 8          | .7             | 3.2          |
| Retro-Food Service       | 1/3               | G | 25 gas          | yes            | 433           | 9 gal          | 9          | .3             | 12.0         |
| total annual per gate    |                   |   |                 |                | <b>4,601G</b> |                |            | <b>27.4</b>    | <b>124.6</b> |
|                          |                   |   |                 |                | gallons       |                |            | gallons        | quarts       |
| Frontside Shuttle        | 1/3               | G | 40 dsl          | no             | 1386D         | 12 gal         | 10         | 4.0            | 13.3         |
| Crew Bus                 | 1/6               | G | 45 dsl          | no             | 780D          | 12 gal         | 10         | .2             | 6.6          |
| Retro-Tug                | 1                 | G | 20 dsl          | no             | 1040D         | 6 gal          | 7          | 6.0            | 28.0         |
| Aircraft Tug             | 1/2               | G | 20 dsl          | no             | 520D          | 6 gal          | 7          | 3.0            | 14.0         |
| Baggage Tug              | 1                 | G | 18 dsl          | no             | 936D          | 6 gal          | 7          | 6.0            | 28.0         |
| Retro-Pullback           | 1/6               | G | 22 dsl          | no             | 190D          | 9 gal          | 9          | 1.5            | 6.0          |
| total annual per gate    |                   |   |                 |                | <b>4,852D</b> |                |            | <b>20.7</b>    | <b>95.9</b>  |
|                          |                   |   |                 |                | gallons       |                |            | gallons        | quarts       |
| PER AIRPORT              |                   |   |                 |                |               |                |            |                |              |
| Meter Reader             | 3                 | A | 12 gas          | yes            | 1872          | 2 gal          | 3          | 6.0            | 54.0         |
| Airport Van              | 2                 | A | 20 gas          | yes            | 2080          | 8 gal          | 7          | 16.0           | 84.0         |
| Staff Car                | 1                 | A | 20 gas          | yes            | 1040          | 7 gal          | 6          | 7.0            | 36.0         |
| Retro-Pickup             | 3                 | A | 20 gas          | yes            | 3120          | 8 gal          | 7          | 24.0           | 126.0        |
| total annual per airport |                   |   |                 |                | <b>8,112G</b> |                |            | <b>53.0</b>    | <b>300.0</b> |
|                          |                   |   |                 |                | gallons       |                |            | gallons        | quarts       |

**Note:** Vehicle Unit quantities are estimated by two factors. Four of the vehicle types are based on units per airport (A) and seventeen vehicle types on the number of units per gate (G) at the airport. Example: if there is normally 1 vehicle for every 2 gates it will be expressed as 1/2 G.

Formula estimate: **Fuel** = units per gate/airport x gallons x 52/104 fillups. **Coolant** = units per gate/airport x gal of coolant (1 change) , **Oil** = units per gate/airport x qts x 4 or 6 changes a year

## Estimated Bay/Delta Airport Impact

## Attachment D

An estimated number of vehicles per gate allows the forecast of the pollutant impact on a mix of Bay/Delta airports. Larger airports (A) will tend to average more vehicles per facility and per gate and very small airports (C) will have less than the average. This is only a guide to the potential impact of IC vehicle replacement with proper EV technology.

ESTIMATES:

|  |              |                 |            |       |
|--|--------------|-----------------|------------|-------|
|  | Fuel gallons | Coolant Gallons | Oil Quarts |       |
| Annual volumes reduced per airport       | 8,112        | 53.0            | 300.0      | PLUS: |
| Annual volumes reduced per airport gate: | 9,453        | 48.1            | 220.5      |       |

| Airport Facilities        | Size Code | Gates Today | Average Vehicles replaced | Potential Fuel gallons | Impact Coolant gallons | Description Oil quarts |
|---------------------------|-----------|-------------|---------------------------|------------------------|------------------------|------------------------|
| Redding                   | (B)       | 2           | 26                        | 27,018                 | 149                    | 741                    |
| Red Bluff                 | (C)       | 1           | 17                        | 17,565                 | 101                    | 520                    |
| Chico                     | (C)       | 2           | 26                        | 27,018                 | 149                    | 741                    |
| Marysville                | (C)       | 1           | 17                        | 17,565                 | 101                    | 520                    |
| McClellan AFB (no combat) | (A)       | 1           | 17                        | 17,565                 | 101                    | 520                    |
| Sacramento Int            | (A)       | 28          | 258                       | 272,796                | 1,397                  | 6,474                  |
| Alameda Center            | (C)       | 1           | 17                        | 17,565                 | 101                    | 520                    |
| San Francisco             | (A)       | 90          | 810                       | 858,882                | 4,850                  | 2,284                  |
| Oakland                   | (A)       | 49          | 445                       | 471,309                | 2,405                  | 1,380                  |
| Stockton                  | (B)       | 5           | 53                        | 55,377                 | 293                    | 1,410                  |
| Modesto                   | (C)       | 1           | 17                        | 17,565                 | 101                    | 520                    |
| Fresno                    | (B)       | 8           | 80                        | 83,736                 | 437                    | 2,060                  |

Total Airports in Bay/Delta Impact area: 12

Estimated Total Gates at Bay/Delta Impact area Airports: 189 (no combat military gates)

## WATER POLLUTION:

Estimated annual gallons of FUEL reduced: 1,883,961 Gasoline: 904,300 Diesel: 979,661

Percentage of fuel with MTBE's: 48%

Estimated annual gallons of Radiator Coolant reduction: 10,185

Estimated annual Quarts of motor oil reduction: 17,690

Air Pollution : Estimated IC vehicles that could be replaced with electric: 1782

|  |                   |                   |          |
|--|-------------------|-------------------|----------|
| Percent reduction of air pollution based upon IC vehicles replaced with electric | Particulates -72% | Hydrocarbons -74% | Nox -70% |
|--|-------------------|-------------------|----------|

## IV. Costs

### Cost Breakdown Table-Airport Demonstration Project CAL FED Step I: TOTAL FUNDING REQUEST = \$1,550,000 (45% of Project)

| Project Scope<br>of Work                                 | Direct<br>Salary<br>& Bene | Overhead<br>Labor<br>(Fee) | Material &<br>Acquisition<br>Contracts | Misc.<br>Direct<br>Costs | Total<br>Cost      |
|--|----------------------------|----------------------------|--|--------------------------|--------------------|
| <b>TASKS in Step One</b>                                 |                            |                            |  |                          |                    |
| 1. Opening the Airport<br>Demonstration Hanger           |                            |                            |  |                          | \$150              |
| Rent   |                            |                            |  | 110                      |                    |
| Improvements   |                            |                            | 40                                     |                          |                    |
| 2. Operating the Airport<br>Demonstration Center         |                            |                            |  | 110                      | \$110              |
| Center   |                            |                            |  |                          |                    |
| Satellites   |                            |                            |  |                          |                    |
| Install  |                            |                            |  |                          |                    |
| Demos  |                            |                            |  |                          |                    |
| 3. Purchasing the EV<br>demonstration equipment          |                            |                            | 671                                    |                          | \$671              |
| 4. Installing the EV<br>charging infrastructure          |                            |                            | 89                                     |                          | \$89               |
| 5. Hiring the Project<br>Personnel                       | 188                        |                            |  |                          | \$188              |
| Airport Mgr  |                            |                            |  |                          |                    |
| Proj Mgr   |                            |                            |  |                          |                    |
| Satellites Mgr   |                            |                            |  |                          |                    |
| Ed Ctr Mgr   |                            |                            |  |                          |                    |
| 6. Maintaining the<br>Equipment                          |                            | 48                         |  |                          | \$48               |
| Maint  |                            |                            |  |                          |                    |
| Training   |                            |                            |  |                          |                    |
| 7. Meetings with the Satellite<br>Bay Delta Airports     | 95                         |                            |  |                          | \$95               |
| 8. Developing the Airport<br>Education Center            |                            | 50                         |  |                          | \$50               |
| Marketing  |                            |                            |  |                          |                    |
| Management   |                            |                            |  |                          |                    |
| Satellites   |                            |                            |  |                          |                    |
| Demo-Ala   |                            |                            |  |                          |                    |
| Demo-Sat   |                            |                            |  |                          |                    |
| 9. Providing the Demos,<br>Classes and Manuals           |                            | 50                         |  |                          | \$50               |
| 10. Administering the Center<br>and Satellite operations | 40                         |                            |  |                          | \$40               |
| Alameda  |                            |                            |  |                          |                    |
| Satellites   |                            |                            |  |                          |                    |
| 11. Assisting Airport to secure<br>EV airport equipment  | 26                         |                            |  |                          | \$26               |
| 12. Collecting key data &<br>Writing Reports             | 33                         |                            |  |                          | \$33               |
| <b>TOTAL</b>   |                            |                            |  |                          | <b>\$1,550,000</b> |

*Reductions in funding would reduce the number of Bay/Delta airports*

The schedule milestones for Step I include the following

| <u>Key actions</u>                                       | <u>Date</u> |      |
|--|-------------|------|
| Developing the Training Classes and Demo Approach        | November    | 1997 |
| Opening the Airport Demonstration Hanger                 | January     | 1998 |
| Purchasing the EV demonstration equipment                | February    | 1998 |
| Hiring the Project Personnel                             | March       | 1998 |
| Delivery of Airport Equipment                            | April       | 1998 |
| Meeting with the Satellite Bay/Delta Airports            | May         | 1998 |
| Opening the Airport Education Center                     | June        | 1998 |
| Providing the Demonstrations, Classes and Manuals        | June        | 1998 |
| Holding first Pier Reviews                               | July        | 1998 |
| Hold Airport Industry Conference                         | August      | 1998 |
| Start Seminar Series on Airport EV Funding               | September   | 1998 |
| Hold second Pier Review                                  | October     | 1998 |
| First Documentation Deliverable-Main Report              | November    | 1998 |
| Assist Satellite Airports to secure EV airport equipment | January     | 1999 |

**This schedule assumes the funding is available by the 1st of October, 1997.**

**The Third Party Impacts** are minimum. If there were difficulty with the building there are similar facilities available at Oakland Airport and McClellan AFB, both within the Bay/Delta geography. All EV equipment is available and it is anticipated that the delivery time is reasonable. A scaled down version of the project, reducing the number of Bay/Delta Satellite Airports, is possible if funding from CALFED were reduced for Step One.

# BAY-DELTA AIRPORT EV DEMONSTRATION BUDGET

In 1,000's of dollars

ATTACHMENT

| Elements                   | "Majority Impact"  |          |          | "Follow-Thru"       |          |          | Total     |
|----------------------------|--------------------|----------|----------|---------------------|----------|----------|-----------|
|                            | Phase I: Years 1-3 |          |          | Phase II: Years 4-6 |          |          |           |
|                            | 1998               | 1999     | 2000     | 2001                | 2002     | 2003     |           |
|                            | Step I             | II       | III      | IV                  | V        | VI       |           |
| <b>LOCATIONS:</b>          |                    |          |          |                     |          |          |           |
| <b>Alameda Airport</b>     |                    |          |          |                     |          |          |           |
| (Demonstration Center)     |                    |          |          |                     |          |          |           |
| Rent                       | 110                | 40       | 0        | 0                   | 0        | 0        | 160       |
| Improvements               | <u>40</u>          | <u>0</u> | 0        | 0                   | 0        | 0        | 0         |
| Subtotals                  | 150                | 40       |          |                     |          |          |           |
| Phase I & II totals        |                    |          | 190      |                     |          | 0        |           |
| <b>Bay/Delta Airports</b>  |                    |          |          |                     |          |          |           |
| (Satellite Location Group) |                    |          |          |                     |          |          |           |
| Involvement/Pier Reviews   |                    |          |          |                     |          |          |           |
| Redding(B)                 | 10                 | 3        | 3        | 4                   | 4        | 5        | 29        |
| Red Bluff(C)               |                    | 15       | 3        | 3                   | 3        | 4        | 28        |
| Chico(C)                   |                    | 15       | 3        | 3                   | 3        | 4        | 28        |
| Marysville(C)              |                    | 15       | 3        | 3                   | 3        | 3        | 27        |
| McClellan AFB(A)           | 20                 | 8        | 8        | 5                   | 5        | 6        | 52        |
| Sacramento Int (A)         | 20                 | 8        | 8        | 5                   | 5        | 6        | 52        |
| San Francisco(A)           | 20                 | 10       | 10       | 6                   | 6        | 7        | 59        |
| Oakland(A)                 | 15                 | 8        | 8        | 5                   | 5        | 6        | 47        |
| Stockton(B)                | 10                 | 3        | 3        | 3                   | 3        | 4        | 26        |
| Modesto(C)                 |                    | 15       | 3        | 4                   | 4        | 5        | 31        |
| Fresno(B)                  | <u>10</u>          | <u>3</u> | <u>3</u> | <u>4</u>            | <u>4</u> | <u>5</u> | <u>29</u> |
| sub-total                  | 95                 | 103      | 55       | 45                  | 45       | 55       | 408       |
| Phase I & II total         |                    |          | 253      |                     |          | 145      |           |
| <b>Alameda EV Demo</b>     |                    |          |          |                     |          |          |           |
| Purchase Equipment (B)     |                    |          |          |                     |          |          |           |
| Security Bikes (2)         | 3                  |          |          |                     |          |          |           |
| Meter Reader               | 24                 |          |          |                     |          |          |           |
| Lowboy Truck               | 13                 |          |          |                     |          |          |           |
| Retro-Tug                  | 40                 |          |          |                     |          |          |           |
| Retro-Pullback             | 50                 |          |          |                     |          |          |           |
| Retro-Baggage Ldr          | 30                 |          |          |                     |          |          |           |
| Retro-Staircase            | 40                 |          |          |                     |          |          |           |
| Retro-Pickup               | 40                 |          |          |                     |          |          |           |
| Personnel 4 Truck          | 26                 |          |          |                     |          |          |           |
| Personnel 6 Truck          | 29                 |          |          |                     |          |          |           |
| Retro-Food Service         | 55                 |          |          |                     |          |          |           |
| Restroom Svc. Van          | 17                 |          |          |                     |          |          |           |
| Staff Car                  | 29                 |          |          |                     |          |          |           |
| Frontside Shuttle          | 165                |          |          |                     |          |          |           |
| Crew Bus                   | <u>110</u>         |          |          |                     |          |          |           |
| sub-total                  | 671                |          |          |                     |          |          |           |
| Phase I & II totals        |                    |          | 671      |                     |          | 0        |           |

**BUDGET, continued-(page 2)**

|                                 | 1998<br>Step I | 1999<br>II | 2000<br>III | 2001<br>IV | 2002<br>V | 2003<br>VI | TOTAL |
|---------------------------------|----------------|------------|-------------|------------|-----------|------------|-------|
| <b>Infrastructure</b>           |                |            |             |            |           |            |       |
| Alameda Chargers                | <b>89</b>      |            |             |            |           |            |       |
| Phase I & II totals             |                |            | <b>89</b>   |            |           | <b>0</b>   |       |
| <b>Personnel (contract)</b>     |                |            |             |            |           |            |       |
| Airport Demo Mgr                | 42             | 36         | 24          |            |           |            |       |
| Bureau Project Mgr              | 48             | 48         | 48          |            |           |            |       |
| Satellite Airport Mgr           | 36             | 24         | 24          | 24         | 24        | 24         |       |
| Education Center Mgr            | 36             | 24         | 12          |            |           |            |       |
| Air Ops Mgr                     | <u>26</u>      | <u>22</u>  | <u>20</u>   |            |           |            |       |
| sub-total                       | <b>188</b>     | 154        | 128         |            |           |            |       |
| Phase I & II totals             |                |            | <b>470</b>  |            |           | <b>72</b>  |       |
| <b>Operations</b>               |                |            |             |            |           |            |       |
| Alameda Center                  | 24             | 14         | 10          |            |           |            |       |
| Satellite Group                 | 12             | 15         | 16          | 20         | 25        | 25         |       |
| Install                         | 32             |            |             |            |           |            |       |
| Demonstrations                  | <u>42</u>      | <u>24</u>  | <u>10</u>   |            |           |            |       |
| sub-total                       | <b>110</b>     | 53         | 36          |            |           |            |       |
| Phase I & II totals             |                |            | <b>199</b>  |            |           | <b>70</b>  |       |
| <b>Maintenance/Upkeep</b>       |                |            |             |            |           |            |       |
| Maintenance Contract            | 32             | 24         | 16          |            |           |            |       |
| Training Alameda                | <u>16</u>      | <u>6</u>   | <u>5</u>    |            |           |            |       |
| sub-total                       | <b>48</b>      | 30         | 21          |            |           |            |       |
| Phase I & II totals             |                |            | <b>99</b>   |            |           | <b>0</b>   |       |
| <b>Education &amp; Training</b> |                |            |             |            |           |            |       |
| Industry Marketing-WEB          | 15             | 2          | 2           |            |           |            |       |
| Management Alameda              | 10             | 10         | 10          |            |           |            |       |
| Mgmt. Satellite Group*          | 25             | 22         | 15          | 10         | 10        | 10         |       |
| Demonstrations-Alameda          | 25             | 16         | 16          |            |           |            |       |
| Demos-Satellite Group*          | <u>25</u>      | <u>28</u>  | <u>28</u>   | <u>30</u>  | <u>32</u> | <u>34</u>  |       |
| sub-total                       | <b>100</b>     | 78         | 70          | 40         | 42        | 44         |       |
| Phase I & II Totals             |                |            | <b>248</b>  |            |           | <b>198</b> |       |
| <b>Administration</b>           |                |            |             |            |           |            |       |
| Implementation Alameda          | 16             | 18         | 18          |            |           |            |       |
| Implem Satellite Group          | <u>24</u>      | <u>28</u>  | <u>28</u>   | 30         | 32        | 34         |       |
| sub-total                       | <b>40</b>      | 46         | 46          |            |           |            |       |
| Phase I & II totals             |                |            | <b>132</b>  |            |           | <b>96</b>  |       |

**BUDGET, continued (page 3)**

|                                    | 1998<br>Step I | 1999<br>II            | 2000<br>III | 2001<br>IV           | 2002<br>V  | 2003<br>VI | TOTAL              |
|------------------------------------|----------------|-----------------------|-------------|----------------------|------------|------------|--------------------|
| <b>Misc &amp; YR End Reporting</b> |                |                       |             |                      |            |            |                    |
| Reporting-Alameda                  | 25             | 22                    | 22          |                      |            |            |                    |
| Reporting-Satellite Group*         | 26             | 30                    | 30          | 30                   | 28         | 22         |                    |
| Redding(B)                         |                |                       |             |                      |            |            |                    |
| Red Bluff(C)                       |                |                       |             |                      |            |            |                    |
| Chico(C)                           |                |                       |             |                      |            |            |                    |
| Marysville(C)                      |                |                       |             |                      |            |            |                    |
| McClellan AFB(A)                   |                |                       |             |                      |            |            |                    |
| Sacramento Int (A)                 |                |                       |             |                      |            |            |                    |
| San Francisco(A)                   |                |                       |             |                      |            |            |                    |
| Oakland(A)                         |                |                       |             |                      |            |            |                    |
| Stockton(B)                        |                |                       |             |                      |            |            |                    |
| Modesto(C)                         |                |                       |             |                      |            |            |                    |
| Fresno(B)                          |                |                       |             |                      |            |            |                    |
| Misc.                              |                |                       |             |                      |            |            |                    |
| Direct Mail                        | <u>8</u>       | <u>8</u>              | <u>8</u>    | <u>8</u>             | <u>8</u>   | <u>8</u>   |                    |
| sub-total                          | <b>59</b>      | 60                    | 60          | 38                   | 36         | 30         |                    |
| Phase I total                      |                |                       | <b>179</b>  |                      |            | <b>104</b> |                    |
| <b>TOTALS BY STEP</b>              | <b>YR1</b>     | <b>YR2</b>            | <b>YR3</b>  | <b>YR4</b>           | <b>YR5</b> | <b>YR6</b> | <b>OVERALL</b>     |
|                                    | <u>1,550</u>   | <u>564</u>            | <u>416</u>  | <u>197</u>           | <u>204</u> | <u>212</u> | <u>3,143,000</u>   |
| <b>PHASE TOTAL</b>                 |                | <b>Phase I: 2,530</b> |             | <b>Phase II: 613</b> |            |            |                    |
| <b>BAQMD &amp; Grp Funding</b>     | <b>382</b>     | —                     | —           | —                    | —          | —          |                    |
| <b>TOTAL Project.....</b>          |                |                       |             |                      |            |            | <b>\$3,445,000</b> |

**NOTES:**

Total six year project is estimated at \$3,445,000, 85% in Phase I (yr 1-3)

1997 CALFED Funding request is \$1,550,000 or 45% of project

\* To teach and assist the 11 satellite airports to secure their own electric vehicles.

## V. Applicant Qualifications

**Alameda Bureau of Electricity** is working with Synergy EV, Inc. and Airport Operations, Inc. on the Bay/Delta **Airport Demonstration project**. The combined qualifications are unparalleled for such a project.

The **Alameda Bureau** of Electricity: (see attached background)

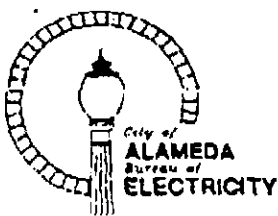
1. Has **110 years of experience** in electric energy projects.
2. Are focused on **Electric Vehicle (EV) Projects** for their Bay Area Island of Alameda. Will assign a full time Project Leader.
3. Have returned **\$62 million dollars** to Alameda City Fund.
4. Have the **technical staff** for electricity based projects, including engineering, project management, data collection & infrastructure

**Synergy EV** has EV experience as a successful:

1. **Raiser** of \$325,000 for an Airport Electrification Project.  
( 1996: Ontario Airport- SAQMD Tarmac retrofit)
2. **Winner** of California Air Resources Board (CARB) EV  
Contract for Airport Electrification ( 1997: Synergy EV, Inc.  
& Accurex Environmental as partners on CARB contract #95-112)
3. **Sole Source Contractor**” of electric vehicles and their support  
for the California State Parks and Recreation Department.
4. **Consulting staff** that have delivered \$103,000,000 of electric  
vehicles world-wide. Synergy will have a Project Manager.

**Airport Operations** specializes in airport management:(Attached)

1. They operate the “Eagle Field” airport project in Los Banos.
2. They are the leader representative for eleven potential airport  
projects for the Restricted-Use Alameda Field.
3. Their staff have thirty years of experience in airport operations.  
They will have a full time Project Manager.



## AN INTRODUCTION TO THE BUREAU OF ELECTRICITY

At 110 years of operation, the Bureau is the oldest municipal utility in California and is among the oldest in the nation, either public or private.

In 1882, Thomas Edison proved the feasibility of central station electric service. Three years later, the Jenney Electric Company, under contract with the City of Alameda, installed a 90-kilowatt generating plant and 13 masts at various locations for street lighting. The City's Board of Trustees exercised its option to purchase the plant upon assurance of its successful operation in 1887.

In 1913, the "Alameda Electric Lamp Post" served as a model for the nation's urban street lighting systems. Alameda was known as the best lighted city in the Bay Area, having more and better lamp posts than any other city per unit of population while its customers benefitted from lower rates.

Since 1914, the Bureau of Electricity has returned over \$62.6 million to the City General Fund. During the 1996 Fiscal Year, dividends to the City, stemming from an approximate 31,000 customer account base, was \$3,020,000.

The Bureau's rates consistently have been competitive with those in surrounding communities. A typical residential bill in Alameda is approximately 5.0 percent lower than in Oakland. Most commercial and industrial bills are also significantly less.

In 1919, the price of oil made the cost of generation in the small City-owned plant excessive, so the purchase of power from the Great Western Power Company was begun. The Bureau has not generated its own power since 1924. In the fiscal year ending June 30, 1996, approximately 70 percent of the Bureau's electric sales revenues were used to purchase wholesale electricity. The Bureau has implemented a successful, ongoing program to plan and acquire electric generation sources that are economical, stable in long-term costs, and environmentally benign.

Since 1982, the Bureau has taken delivery of low-cost hydroelectric power from the Central Valley Project of the Western Area Power Administration, a marketing arm of the U.S. Department of Energy. Through the Northern California Power Agency (NCPA), a joint powers agency comprised of the Bureau and 14 other Northern California municipal entities, Alameda has investments in geothermal, combustion turbine, and hydroelectric generating facilities.

In accordance with the City Charter, four Commissioners appointed by the Mayor with the concurrence of the City Council and the City Manager (as an ex-officio member) form the Public Utilities Board which establishes policy, approves major purchases, and provides for local control for one of Alameda's largest businesses.

06.04.97 - MFM

# Air Operations, Inc.

## ELECTRIC VEHICLES FOR AVIATION

The Nimitz Field Project has been offered an opportunity to participate in a program for electric vehicles (EV's) as they relate to the commercial/military aviation industry. The City of Alameda Bureau of Electricity is currently working with an associate of ours, SYNERGY EV, Inc., on an aviation oriented EV project, and we are anxiously following the progress of these efforts.

In essence, in our plan Nimitz Field would become the home of the world's first Airport/Air Base Electric Vehicle Demonstration Center and Think-Tank. Electric vehicles are a natural for the commercial/military aviation industry and at this time there are at least eleven different EV's being designed and/or developed within the industry. Because the San Francisco Bay area is such a wonderful tourist destination, with year-round good weather and excellent air transportation, it is the ideal place to demonstrate these vehicles in action. Nimitz Field itself is the perfect upscale location to stage demonstrations and workshops for officials who represent commercial airports around the world. One big advantage Nimitz Field has over other airfields is the fact there will be minimal air traffic to interfere with these demonstrations.

It will work like this: We will create a make believe commercial airport, using a hangar, the control tower building and a not-in-service airliner. This facility would be used to demonstrate electric powered aircraft tow tugs, security cycles, in-terminal transporters, tarmac sweepers, delivery vans, pickups, shuttle and light transit buses as well as baggage handling and people loading equipment. Nimitz Field would be a "showroom," and ultimately a training workshop and think-tank for users of this type of equipment.

## VI. Compliance

**The City of Alameda, Bureau of Electricity has reviewed the project and have provided the attached approval Resolution # 4331.**

**The parallel and companion \$301,000 Grant Proposal to the Bay Area Air Quality Management District is attached. Other similar Proposals are being prepared for other Air Districts around the Bay/Delta Satellite airports.**

**The Bureau Attorney is reviewing the required Terms and Conditions and forms.**

CITY OF ALAMEDA  
BUREAU OF ELECTRICITY

RESOLUTION NO. 4331

AUTHORIZING SUBMITTAL OF AN APPLICATION FOR CALFED CATEGORY  
FUNDING FOR THE AIRPORT EV DEMONSTRATION CENTER PROJECT

WHEREAS, the City of Alameda Bureau of Electricity (Bureau) is a supporter of clean and clean water and wishes to take action to enhance air and water quality affecting the City by promoting the use of electric vehicles; and

WHEREAS, the Bureau wishes to encourage the development of an electric vehicle in Alameda; and

WHEREAS, the Bureau, as a public agency, is eligible to submit projects or programs to the CALFED Bay-Delta Program Restoration Coordination Program Category III Funding; and

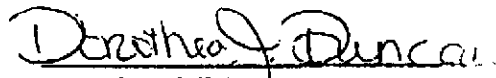
WHEREAS, the Bureau has identified the Airport Electric Vehicle Demonstration Center as a project eligible for these funds.

NOW, THEREFORE, BE IT RESOLVED that the Public Utilities Board hereby directs the Acting General Manager of the City of Alameda Bureau of Electricity to submit an application for Category III funding to the CALFED Bay-Delta Program Restoration Coordination Program for the Airport Electric Vehicle Demonstration Center Project and to execute a funding agreement with the CALFED for this project if the application is approved for funding.

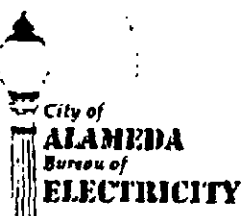
I, the undersigned, hereby certify that the foregoing resolution was regularly introduced and adopted by the Public Utilities Board of the City of Alameda in regular meeting assembled on the 22nd day of July 1997, by the following vote to-wit:

AYES: Commissioners Baldassarre, Flint, Hanna, Russum, and President Hansen.  
NOES: None  
ABSENT: None

IN WITNESS WHEREOF, I have set my hand this 22nd day of July 1997.

  
Dorothea J. Duncan  
Secretary Pro-Tem

JEB:DD  
GAUSERS\ALLSHARE\RES4331



May 28, 1997

Thomas C. Addison,  
Environmental Planner  
Bay Area Air Quality Management District  
939 Ellis Street  
San Francisco, CA 94109

Dear Tom:

This letter is to confirm the City of Alameda Bureau of Electricity's sponsorship of the Alameda Airport Electric Vehicle (EV) Demonstration Center Project including the support of the EV Fleet Loaner Program.

In its proposed fiscal year 1998 budget, the Bureau has targeted \$25,000 in matching funds for this project. In addition, the Bureau intends to provide and install two charging stations accessible to the public in the Demonstration Center visitors parking area and to install the charging equipment for the demonstration vehicles within the facility if funds are awarded for this purpose. Availability of these funds is subject to the final approval of the Public Utilities Board.

If you have any questions regarding this information, please contact Jim Baak at (510) 748-3944.

Sincerely,

A handwritten signature in cursive script, appearing to read "J. Boyer".

Juelle-Ann Boyer  
Acting General Manager

cc: Jim Baak  
Bob Boshoven

J:\SHAREVEB\DOCELECTVEH\97GRANT3.LTR

2000 Grand Street • P.O. Box H • Alameda, California 94501-0263 • 510-748-3901 • FAX 510748-3975